

WHAT IS CLAIMED IS:

1. A method of irradiating an article from a radiation source where the article absorbs the radiation at different positions in the article in accordance with irregularities in the characteristics of the article at the different positions, including the steps of:

providing the radiation from the source in a particular direction,

providing a container including the articles,

absorbing the radiation energy passing from the source to the articles at the different positions in the container in accordance with the irregularities in the characteristic of the article at the different positions to maintain the radiation dose at the different positions in the article within particular minimum and maximum limits, and

moving the container past the radiation from the source in a direction transverse to the particular direction.

2. A method as set forth in claim 1 wherein

the absorption is provided by a fixture having characteristics for absorbing the radiation energy at the different positions in the articles in the container depending upon

the irregularities in the characteristics of the articles in the container at the different positions.

3. A method as set forth in claim 2 wherein

the articles in the container are moved past the radiation from the source in a direction substantially perpendicular to the particular direction and wherein

the articles have at least one of an irregular configuration and density and the fixture has at least one of a configuration and density which, when combined with the at least one of the configuration and density of the articles in the container, provides at least one of a regular configuration and density.

4. A method of irradiating articles from a radiation source where the articles absorb the radiation from the source at different positions in the articles in accordance with irregularities in the characteristics of the articles at the different positions, including the steps of:

providing radiation from the source in a particular direction,

providing a container including the articles,

moving the articles in the container past the radiation from the source in a second direction transverse to the particular direction, and

providing for the absorption of the radiation energy from the source within particular minimum and maximum limits at the different positions in the articles in the container regardless of the irregularities in the characteristics of the articles at the different positions.

5. A method as set forth in claim 4 wherein

the absorption of the radiation energy from the source within the particular minimum and maximum limits is controlled by a fixture disposed externally of the container and having irregularities complementary at the different positions to the irregularities provided by the articles at the different positions.

6. A method as set forth in claim 4 wherein

the articles are conveyed past the radiation source in a direction substantially perpendicular to the particular direction and at a substantially constant speed.

7. A method of irradiating articles from a radiation source where the articles absorb the irradiation from the source at different positions in the articles in accordance with irregularities in the characteristics of the articles at the different positions, including the steps of:

5 providing radiation from the source in a particular direction,
providing a container including the articles,
moving the articles past the radiation from the source in a second direction
substantially perpendicular to the particular direction, and
compensating outside of the container for the irregularities in the characteristics of
10 the articles in the container at the different positions in the article to provide a uniformity
in the radiation dose at the different positions in the articles in the container within
particular minimum and maximum limits.

8. A method as set forth in claim 7 wherein
the irregularities in the articles in the container at the different positions in the
container result from irregularities in at least one of the dimension and density of the
articles in the particular direction in the container and wherein

5 the compensation is provided for the irregularities in the at least one of the
dimension and density of the articles in the particular direction in the container.

9. A method as set forth in claim 8 wherein

the article is conveyed past the radiation from the source in a direction
substantially perpendicular to the particular direction.

10. A method of irradiating an article from a radiation source where the article
has irregular characteristics including at least one of an irregular geometrical shape and
density and absorbs radiation passing through the article by an amount depending upon
the irregular characteristics, including the at least one of the irregular geometrical shape
and density, of the article and where the article has different absorption characteristics to
5 radiation at progressive positions in the article, including the steps of:

providing the radiation from the radiation source in a first direction,

providing a container including the article inside the container,

providing outside of the container a fixture having irregular characteristics,

10 including at least one of an irregular geometric shape and density, at progressive positions
to compensate for the differences in the irregularities of the characteristics, including

irregularities in the at least one of the geometric shape and density, of the articles in the container at the progressive positions,

disposing the fixture relative to the articles in the container to provide the
15 combination of the articles and the fixture with the compensating characteristics at the progressive positions in response to the radiation, and

moving the combination of the container and the fixture at the progressive
positions past the radiation source to irradiate the articles in the container at the
progressive positions.

11. A method as set forth in claim 10 wherein

the fixture has irregular characteristics at progressive positions, depending upon
the irregularities in the characteristics of the articles in the container at the progressive
positions, to compensate for the irregularities in the characteristics of the articles at the
5 progressive positions.

12. A method as set forth in claim 10 wherein

the combination of the container and the fixture is moved past the radiation from the radiation source at a substantially constant speed in a direction substantially perpendicular to the direction of the radiation.

13. A method as set forth in claim 10 wherein

the fixture is made from a material selected from a group consisting of a plastic and a metal and having characteristics of absorbing the radiation substantially corresponding to the characteristics of the article in the container in absorbing the radiation.

14. A method of irradiating articles from a radiation source where the articles have characteristics of absorbing at progressive positions different doses of radiation per unit of distance of travel of radiation through the article, including the steps of:

providing radiation in a particular direction from the source,

providing a container including a plurality of articles,

providing a fixture having characteristics of absorbing at progressive positions in the fixture different doses of radiation per unit of distance of travel of the radiation

through the fixture, the different doses of the radiation per unit of distance of the travel of the radiation through the fixture corresponding to the different doses of the radiation per unit of distance of travel of the radiation through the articles to maintain within particular minimum and maximum limits at the progressive positions the amount of radiation received by the article per unit of travel of the radiation through the article,

disposing the fixture external to the container and relative to the articles in the container to maintain within particular limits at the progressive positions the dose of radiation received by the articles per unit of distance of travel of the radiation through the articles, and

moving the combination of the container and the fixture at the progressive positions past the radiation from the radiation source to obtain the absorption by the articles of the radiation from the source within the particular limits at the progressive positions in the articles.

15. A method as set forth in claim 14 wherein

the combination of the container and the fixture is moved past the radiation from the radiation source at a substantially constant speed in a direction substantially perpendicular to the direction of the radiation from the source.

16. A method as set forth in claim 15 wherein

each of the containers and each of the associated fixtures is spaced from the adjacent containers and fixtures by a particular distance within particular limits when the containers and the associated fixtures are moved past the radiation from the source.

17. A method of irradiating articles from a radiation source where the articles absorb radiation passing through the article by a dosage depending upon irregularities in the characteristics, including irregularities in the at least one of the geometric shape and density, of the articles and where the articles have different absorption characteristics to radiation at progressive positions in the articles, including the steps of:

providing the radiation from the radiation source in a first direction,

providing a container including the articles,

providing a fixture having at the progressive positions characteristics, including at least one of the geometric shape and density, constituting a difference between substantially constant characteristics and the irregularities in the characteristics of the articles in the container at the progressive positions,

disposing the fixture exteriorly relative to the container to provide the substantially constant characteristics for the combination of the articles in the container and the fixture at the progressive positions, and

15 moving the combination of the container and the fixture past the radiation from the source at the progressive positions.

18. A method as set forth in claim 17 wherein

the combination of the container and the article are moved past the radiation from the source in a second direction substantially perpendicular to the first direction.

19. A method as set forth in claim 17 wherein

the articles have irregularities in at least one of the dimension and the density of the fixture in the first direction at the progressive positions and wherein

5 the fixture has irregularities in the at least one of the dimension and density of the articles in the first direction at the progressive positions to provide a substantially constant dimension in the first direction at the progressive positions when the at least one of the dimensions and density of the article and the fixture in the first direction at the progressive positions are combined.

20. A method as set forth in claim 17 wherein

the progressive positions in the articles in the container and in the fixture are in a direction substantially perpendicular to the first direction.

21. A method of irradiating articles from a radiation source where the articles absorb radiation passing through the articles by a dosage depending upon the characteristics, including at least one of the geometric shape and the density, of the articles and where the articles have different absorption characteristics to radiation at progressive positions in the articles, including the steps of:

providing the radiation from the radiation source in a first direction,

providing a container including the articles,

providing a fixture with characteristics of absorbing the radiation corresponding to the characteristics of the articles to provide a substantially constant absorption in the articles in accordance with a difference between a substantially constant absorption and the absorption of the radiation by the articles at the progressive positions,

disposing the fixture exteriorly of the container to provide the substantially constant absorption at the progressive positions of the combination of each of the articles in the container and the fixture, and

15 moving the combination of the container and the fixture past the radiation from the source in a direction substantially perpendicular to the first direction.

22. A method as set forth in claim 21 wherein

the characteristics in the articles include the at least one of the geometrical shape and density of the articles and wherein the characteristics in the fixture include the at least one of the geometrical shape and density of the fixture and wherein

5 the at least one of the geometrical shape and density of the fixture provides the difference between the substantially constant characteristics and the irregularities in the at least one of the geometric shape of the articles in the container at the progressive positions.

23. A method as set forth in claim 21 wherein

the fixture includes two (2) fixture portions respectively disposed exteriorly of the container on the opposite sides of the container in the direction of the radiation from the source.

24. A method as set forth in claim 21 wherein

the fixture includes a single fixture having at least one of the a geometrical shape and density providing the difference between the substantially constant characteristics and the irregularities in the articles in the container at the opposite sides of the articles.

25. A method of irradiating articles from a radiation source where the articles absorb radiation by a dosage depending upon the characteristics of the articles and where the articles have different absorption characteristics to the radiation at progressive positions in the articles, the absorption of the radiation in the articles being dependent upon the at least one of the composition and geometric shape and density of the articles, including the steps of:

providing the radiation from the source in a particular direction,

providing a container including the articles,

providing a fixture having a composition with characteristics of absorbing the radiation corresponding to the absorption of the radiation by the at least one of the composition density and geometrical shape of the articles and having at progressive positions absorption characteristics compensating the absorption characteristics of the articles at the progressive positions,

15 disposing the fixture outside of the container to provide the at least one of a
substantially constant geometric shape, density and composition between the combination
of the articles and the fixture at progressive positions on the articles, and
moving the combination of the container and the fixture past the radiation from the
source in a direction substantially perpendicular to the radiation from the source.

26. A method as set forth in claim 25 wherein

the articles are provided with irregularities in at least one of their geometric shape,
composition and density and wherein

the fixture is provided with irregularities in the at least one of its geometric shape,
composition and density and wherein

the irregularities in the at least one of the geometric shape, density and
composition of the fixture at the progressive positions are complementary to the at least
one of the irregularities in the geometric shape, density and compositions of the articles at
the progressive positions.

27. A method as set forth in claim 26 wherein

the irregularities in the at least one of the geometric shape, density and composition of the articles are disposed on the opposite sides of the articles in the direction of the radiation from the source.

28. A method as set forth in claim 25 wherein

the irregularities in the at least one of the geometric shape, composition and density of the fixture are disposed on a single side of the articles in the direction of the radiation from the source.

29. In combination,

a radiation source for providing radiation in a particular direction,

a container including a plurality of articles each having irregularities in its characteristics at different positions in the article where the irregularities in the characteristics produce non-uniformities in the absorption or dosage in the article from the radiation source,

a fixture disposed outside of the container and having characteristics of absorbing the radiation energy from the source at the different positions, relative to the irregularities

in the absorption by the articles at the different positions, to provide a substantial
10 uniformity in the absorbed dosage at the different positions in the articles within
particular minimum and maximum limits, and

a conveyor for moving the container and the fixture past the radiation from the
source in a direction perpendicular to the particular direction.

30. In a combination as set forth in claim 29 wherein
the irregularities in the characteristics of the articles include irregularities at least
one of in the geometrical shape, density and composition of the articles and wherein
the irregularities in the characteristics of the fixture include irregularities in the at
5 least one of the geometrical shape, density and composition of the fixture.

31. In a combination as set forth in claim 30 wherein
the combination of the irregularities in the at least one of the geometrical shape,
density and composition of the articles and the irregularities in the at least one of fixture
provide at least one of the substantially constant geometrical shapes, density and
5 composition of the articles within particular minimum and maximum limits.

32. In combination,

a radiation source for providing radiation in a particular direction,

a container including a plurality of articles each having irregularities in its characteristics at different positions in the article where the irregularities in its characteristics affect the radiation dosage absorbed by the article at the different positions from the radiation source,

a fixture having irregularities in its characteristics to compensate for the irregularities in the characteristics of the articles, the fixture being disposed outside of the container, and

a conveyor for moving the container and the fixture in a direction substantially perpendicular to the particular direction.

33. In a combination as set forth in claim 32 wherein

the irregularities in the characteristics of the articles constitute at least irregularities in the at least one of the geometrical shapes, density and composition of the articles and wherein

the irregularities in the characteristics of the fixture constitute irregularities in at least one of the geometrical shapes, density and composition of the fixture.

34. In a combination as set forth in claim 32 wherein

the irregularities in the at least one of the geometrical shape, density and composition of the article constitute irregularities in at least one of the dimension, density and composition of the article in the direction of the radiation from the source and wherein

the irregularities in the at least one of the geometrical shape, density and composition of the fixture constitute irregularities in the at least one of the dimension, density and composition of the fixture in the direction of the radiation from the source.

35. In a combination as set forth in claim 32 wherein

the container is moved past the radiation from the source at a substantially constant speed within particular limits.

36. In a combination as set forth in claim 32 wherein

the container is one of a sequence of containers and wherein the fixture is one of a sequence of fixtures and wherein the containers and the fixtures are moved in sequence past the radiation from the source at a substantially constant speed within particular limits and wherein

the containers and the fixtures are moved in sequence past the radiation from the source with a minimal separation between the containers within particular limits.

37. In combination for receiving radiation in a particular direction from a radiation source,

a container including a plurality of articles each having irregularities in its characteristics at different positions in the article where the irregularities in the characteristics of the article cause irregularities to be produced in the dosage received by the article from the radiation source at the different positions, and

a fixture having irregularities in its characteristics at different positions in the fixture where the irregularities in the characteristics of the fixture cause irregularities to be produced in the dosage received by the articles from the radiation source at the different positions, the irregularities in the characteristics of the fixture at the different positions complementing the irregularities in the characteristics of the articles at the different positions to provide a substantial uniformity in the dosage at the different positions in the articles within particular minimum and maximum limits.

38. In a combination as set forth in claim 37,

the fixture and the articles being movable past the radiation from the source to receive radiation from the source.

39. In a combination as set forth in claim 37,

the fixture including a first fixture portion on one side of the articles and a second fixture portion on the opposite side of the articles, the first and second fixture portions being separated from each other, and the container being disposed between the fixtures in a direction corresponding to the direction of the radiation from the source.

40. In a combination as set forth in claim 38,

the articles having irregularities in its characteristics at the different positions on opposite sides of the articles and the fixture being provided with irregularities in its characteristics at the opposite sides of the container to compensate for the irregularities in the characteristics of the articles and to provide substantially the uniformity in the radiation dosage at the different positions in the articles within the particular minimum and maximum limits.

41. In a combination as set forth in claim 37,

the fixture being disposed on one side of the container and being provided with irregularities in its characteristics to compensate for the irregularities in the characteristics of the articles on the opposite sides of the articles and to provide substantially the uniformity in the radiation dosage at the different positions in the articles within the particular minimum and maximum limits.

42. In a combination as set forth in claim 37,

the fixture including a first fixture portion on one of the opposite sides of the articles and including a second fixture portion on the other of the opposite sides of the articles, the first fixture portion having irregularities in its characteristics to compensate for the irregularities in the characteristics of the articles on the one of the opposite sides of the articles and the second fixture portion having irregularities in the characteristics of the articles on the other of the opposite sides of the articles to compensate for the irregularities in the articles on the other of the opposite sides of the articles.

43. In combination for receiving radiation in a particular direction from a radiation source,

a container including a plurality of articles each having irregularities in its characteristics at different positions in the articles, and

5 a fixture disposed relative to the container and having irregularities in its characteristics for compensating for the irregularities in the characteristics in the articles in the container at the different positions in the articles to provide substantially a uniformity in the characteristics of the articles at the different positions within particular minimum and maximum limits.

44. In a combination as set forth in claim 43,

the container and the fixture being disposed relative to the radiation source to provide for the passage of the radiation from the source through the articles in the container and the fixture.

45. In a combination as set forth in claim 43,

the irregularities in the characteristics of the articles constituting at least irregularities in at least one of the geometrical shape, density and composition of the articles and the irregularities in the characteristics of the fixture constituting irregularities
5 in at least one of the geometrical shape, density and characteristics of the fixture.

46. In combination,

a container,

a plurality of articles disposed in the container to be irradiated, each of the articles having irregularities in its characteristics at progressive positions in the articles in

5 response to radiation, and

a fixture disposed externally of the container and having irregularities in its characteristics at progressive positions in response to radiation to compensate for the irregularities in the characteristics of the articles in the container at the progressive positions.

47. In a combination as set forth in claim 46 wherein

the irregularities in the characteristics of the articles and in the fixtures provide irregularities in the response of the articles and the fixtures to radiation.

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48. In a combination as set forth in claim 46,
a conveyor for moving the container and the fixture in a first direction, and
a source of radiation disposed relative to the container and the fixture for
irradiating the articles in the container and the fixture in a second direction substantially
perpendicular to the first direction.

49. In a combination as set forth in claim 46 wherein
the fixture is made from a material selected from a group consisting of a plastic
and a metal and having substantially the same characteristics per unit of distance of
absorbing irradiation as the articles in the container.

50. In a combination as set forth in claim 48 wherein
the irregularities in the characteristics of the articles and in the fixtures provide
irregularities in the absorption of radiation of the articles and the fixtures to radiation.

51. In a combination as set forth in claim 46,
a conveyor for moving the container and the fixture in a first direction, and
a source of radiation disposed relative to the container and the fixture for
irradiating the articles in the container and the fixture in a second direction substantially
5 perpendicular to the first direction.

52. In a combination as set forth in claim 47 wherein
the fixture is made from a material selected from a group consisting of a plastic
and a metal and having substantially the same characteristics of absorbing radiation as the
articles in the container.